Project Idea Submission – *Research*

# Laboratory Information

**Name: ­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­\_David Warsinger and Jose Garcia-Bravo\_\_\_\_\_\_\_\_ Date:­­­­ 09-06-24\_**

# Laboratory’s Liaison Contact Information

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**West Lafayette\_\_ \_\_\_\_\_\_ \_IN\_\_\_\_ \_47907\_\_\_\_\_\_\_\_**

**City State ZIP Code**

# Project Name

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| Hydropower Collegiate Competition (HCC) |

# General Project Description

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| The aim of this project is to implement novel methods for electricity generation using hydropower while addressing the environmental implications of the system. The methods to deploy include multistory reservoirs to separate the streams for power generation from those dedicated to transfer of species and regeneration of hydrostatic power using pump-turbine coupling devices. For this year’s (HCC 2025), we will enhance the design of the hydropower systems by optimizing the performance of the systems based on the temporal electricity demand. Such investigation requires modeling and testing hydraulic devices, optimization of the system components, data and cost analysis. |

# What is the Mechanical Engineering problem (Apparatus) you are wanting Solved (Built)?

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| Build a scaled prototype of the Hydropower generator concept and perform a series of tests |

# Why is this problem (Apparatus) worth solving (Building)? (Value Proposition)

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| Build an effective prototype that will be tested in a lab or tank for performance and will deliver measured results. Teams have the discretion to decide what to test and where to perform tests |

# what are the most important functional requirements and specifications for this project?

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| Req 1: Teams perform a site selection process and then develop a feasibility assessment for the selected site  Req 2: Teams either create a conceptual design of their selected site or complete a final design for a component or system  Req 3: Consideration of environmental factors for construction of hydropower plants …  Spec 1: Open and dependent upon site chosen  Spec 2: Budget limited to $15k including travel to competition  … |

# What do you anticipate the students designing, analyzing, building/prototyping and testing? Be as specific as possible.

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| Design: A hydropower generator based on a site chosen approximately 4.4 MW, design methods to deploy include multistory reservoirs to separate the streams for power generation.  Analyze: Potential Dam retrofitting that incorporates fish passage technology to preserve the local ecosystem and simultaneously generate hydropower. The potential target site is Brookville Lake Dam  Build: Scale down version of multistory reservoir generator  Test: Feasibility of the design and performance of the design |

# What is you best estimate of the cost of the hardware, components, materials, … of the proposed prototype?

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| Total $ 15,000  Hardware Costs: $2,000  Component Costs: $3,000  Material Costs: $5,000  Travel Costs: $5,000 |

# How much time and effort would you expect to spend on this project if you were doing it internally?

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| Calendar Months: 10 Total Hours (Engineering, Shop, …): 100 hrs. |

# Do you believe the project can be completed with existing technology, if not, elaborate on needed DEVELOPMENTS?

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| Yes, focus is on design and testing a scaled down prototype |

# concerns or Other related information associated to the proposed project?

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| Concerns: New concept, design needs to done early, and construction of prototype is different than actual dam design  Other Info: https://www.herox.com/hydropower-collegiate-competition-2025 |

# Attach any appropriate Sketches, Drawings, standards, Data, photos, … useful in judging appropriateness and scope of proposed project.

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| Instructions are on website for the competition |

# Are you working with ME Seniors who you would like on this proposed project? Yes/no (If YES, provided what information you can.)

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| NAME | PUID | Phone | EMAIL |
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Save this filled out .docx with the following naming nomenclature: “RESEARCH\_*project name* – *student point of contact full name*.docx” where the *italic strings* get replaced with appropriate actual text strings.

If you have any questions concerning a proposed project or completing this form please contact Professor Greg Jensen.

**To submit this document for consideration, please complete the survey using either the QR code or the link below.**

**A qr code on a white background

Description automatically generated**

https://purdue.ca1.qualtrics.com/jfe/form/SV\_bkCjo7jyE5Wb7ro

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